WE CLAIM:

1. A multi-beam probe for interferometrically measuring compound surfaces of a test object comprising:

a probe body having a reference axis;

a beamsplitter that divides a beam into first and second measuring beams propagating within the probe body;

a first deflector that directs the first measuring beam from the probe body at a given angle with respect to the reference axis for measuring one of the compound surfaces;

a second deflector that directs the second measuring beam from the probe body at one of a plurality of variable angles with respect to the reference axis for measuring other of the compound surfaces; and

a beam adjuster associated with the second deflector that changes the variable angle between:

a first variable angle at which the second measuring beam is directed from the probe body for measuring a second of the compound surfaces, and

a second variable angle at which the second measuring beam is directed from the probe body for measuring a third of the compound surfaces.

2. The probe of claim 1 in which the beam adjuster includes an indexing mechanism for changing the variable angles.

3. The probe of claim 2 in which the indexing mechanism intermittently indexes the second deflector between variable angles by a discrete increment.

4. The probe of claim 2 in which the indexing mechanism continuously indexes the second deflector between variable angles through a continuum of increments.

5. The probe of claim 2 in which the second deflector includes a deflector body that is rotatable about an indexing axis for successively deflecting the second measuring beam through the first and second variable angles.

6. The probe of claim 5 in which the indexing axis extends parallel to the reference axis of the probe.

7. The probe of claim 5 in which the indexing axis extends perpendicular to the reference axis of the probe.

8. The probe of claim 7 in which the variable angle is adjustable within an axial plane that includes the reference axis.

9. The probe of claim 8 in which the first and second variable angles are true length in the axial plane.

10. The probe of claim 1 in which the second deflector includes a reflective facet for reflecting the second measuring beam through one of the variable angles.

11. The probe of claim 10 in which the reflective facet is one of a plurality of reflective facets supported on an adjuster body.

12. The probe of claim 11 in which the plurality of reflective facets includes a first facet for reflecting the second measuring beam through the first variable angle and a second facet for reflecting the second measuring beam through the second variable angle.

13. The probe of claim 12 in which the beam adjuster moves the adjuster body between successive positions at which the second measuring beam is reflected from the first and second reflective facets.

14. The probe of claim 13 in which the plurality of reflective facets includes a third facet for reflecting the second measuring beam through a third variable angle, and the beam adjuster further moves the adjuster body through another successive position at which the second measuring beam is reflected from the third reflective facet.

15. The probe of claim 14 in which the facets are equally spaced around a rotational axis of the adjuster body, and the beam adjuster rotates the adjuster body between the successive positions.

16. The probe of claim 1 in which the given angle at which the first deflector directs the first measuring beam from the probe body is a fixed angle.

17. The probe of claim 1 further comprising focusing optics associated with the first and second measuring beams for focusing the first and second beams on the compound surfaces of the test object.

18. The probe of claim 17 in which the focusing optics are located between the beamsplitter and the first and second deflectors within the probe body.

19. A multi-beam probe for interferometrically measuring compound surfaces of a test object comprising:

a probe body having separate optical pathways for propagating first and second measuring beams;

focusing optics that separately focus the first and second measuring beams beyond the probe body for measuring different compound surfaces of the test object; and

an adjustable beam deflector that inclines the second measuring beam with respect to the first measuring beam through a range of angles for measuring more than one of the compound surfaces with the second measuring beam.

20. The probe of claim 19 in which the adjustable beam deflector includes a deflector body that is movable between successive positions that incline the second measuring beam through different angles with respect to the first measuring beam.

21. The probe of claim 20 in which the deflector body supports a plurality of reflective facets that are inclined with respect to each other, each of the facets providing for reflecting the second measuring beam at one of the different angles.

22. The probe of claim 21 in which the deflector body is supported in a kinematic mount for constraining motion of the deflector body in three orthogonal directions of rotation and three orthogonal directions of translation.

23. The probe of claim 22 in which one of the constraints of motion is suspended to permit the deflector body to be indexed between positions at which different reflective facets reflect the second measuring beam.

24. The probe of claim 23 in which the deflector body is rotatable about an indexing axis for presenting the facets to the second measuring beam in succession for successively measuring the compound surfaces.

25 The probe of claim 24 in which the deflector body is a disk that is rotatable about the indexing axis, and the facets are formed as reflective surfaces of the disk.

26. The probe of claim 19 in which the first and second measuring beams propagate through the probe body with respect to a reference axis and further comprising a fixed deflector that inclines the first measuring beam with respect to the reference axis.

27. The probe of claim 26 in which the first measuring beam is inclined through a fixed angle in an axial plane that includes the reference axis, and the second measuring beam is inclined through the range of angles in the same axial plane.

28. The probe of claim 19 in which the adjustable beam deflector includes a deflector body that is removable from the probe body and re-mountable within the probe body in a different angular orientation for changing the inclination of second measuring beam through different angles with respect to the first measuring beam.

29. The probe of claim 28 in which the deflector body is supported in a kinematic mount for constraining motion of the deflector body in three orthogonal directions of rotation and three orthogonal directions of translation, and one of the constraints of motion is suspended to permit the deflector body to be removed from the probe body.

30. The probe of claim 29 in which the deflector body supports a plurality of reflective facets that are inclined with respect to each other, and the deflector body is re-mountable within the probe body in different orientations that present different reflective facets to the second measuring beam.

31. A system for interferometrically measuring compound rotational surfaces of a test object comprising:

a rotatable test object support for rotating the test object about a rotational axis;

a multi-beam probe for focusing first and second measuring beams on different compound rotational surfaces of the test object;

beam directional optics within the multi-beam probe for inclining the first and second measuring beams with respect to the rotational axis for measuring first and second of the compound rotational surfaces; and

an adjustment mechanism within the multi-beam probe that varies the inclination of the second measuring beam with respect to the rotational axis for measuring a third of the compound rotational surfaces.

32. The system of claim 31 further comprising a processor that processes information from the first measuring beam about the first compound rotational surface for determining a datum axis of the test object and that processes information from the second measuring beam for referencing information about the second and third compound rotational surfaces with respect to the datum axis.

33. The system of claim 32 in which the datum axis differs from the rotational axis.

34. The system of claim 32 in which the processor compares phase information between the first and second measuring beams and a common reference beam.

35. The system of claim 31 further comprising focusing optics that focus the first measuring beam on the first compound rotational surface at normal incidence and that successively focus the second measuring beam on the second and third compound rotational surfaces at normal incidence.

36. The system of claim 31 in which the adjustment mechanism includes an indexing mechanism for changing the inclination of the second measuring beam with respect to the rotational axis.

37. The system of claim 36 in which the indexing mechanism changes the inclination of the second measuring beam with respect to the rotational axis within a plane that includes the rotational axis.

38. The system of claim 37 in which the indexing mechanism changes the inclination of the second measuring beam with respect to the rotational axis by a discrete increment.

39. The system of claim 31 in which the beam directional optics include:

a first deflector that directs the first measuring beam from the multi-beam probe at a given angle with respect to the rotational axis for measuring the first compound rotational surface, and

a second deflector that directs the second measuring beam from the multi-beam probe at one of a plurality of variable angles with respect to the rotational axis for successively measuring the second and third compound rotational surfaces.

40. The system of claim 39 in which the adjustment mechanism changes the variable angle between:

a first variable angle at which the second measuring beam is directed from the multi-beam probe for measuring the second compound rotational surface, and

a second variable angle at which the second measuring beam is directed from the multi-beam probe for measuring the third compound rotational surface.

41. The system of claim 31 further comprising a scanning mechanism that relatively moves the multi-beam probe with respect to the test object for scanning areas of the compound test surfaces.

42 The system of claim 41 in which the scanning mechanism includes a first drive for relatively moving the probe parallel to the rotational axis of the test object and a second drive for relatively moving the probe perpendicular to the rotational axis of the test object.

43. The system of claim 42 in which the relative motions of the probe are within a common axial plane in which the first and second measuring beams are relatively inclined.